Contributors to This Issue

T. A. Abele, Dipl.-Ing., 1958, Dr. Ing., 1960, Institute of Technology, Aachen, Germany; Bell Telephone Laboratories, 1963—. At Bell Telephone Laboratories Mr. Abele has been concerned with developing microwave transmission components for the TM, TD-3, TD-2B and TH-3 radio relay systems. He supervises a group responsible for designing and developing microwave networks and circuits. Member, Nachrichtentechnische Gesellschaft (NTG).

Alfred J. Alberts, B.S.E.E., 1957, Newark College of Engineering; Bell Telephone Laboratories, 1947—. Mr. Alberts helped design microwave filters and networks for early experimental radio relay systems and for the TD-2 microwave system. He has been concerned with designing and developing microwave and coaxial apparatus for subsequent radio relay systems, and is engaged in the mechanical design of microwave transmission components for the TH-3 and TD-3 radio systems.

John F. Barry, B.S., 1961, and M.S., 1963, both from Northeastern University; Bell Telephone Laboratories, 1961—. Mr. Barry's work has included circuit development for TH Radio, *Bellboy*® personal signaling set, and FM terminals. He now is designing IF switching circuits for broadband restoration. Member, Eta Kappa Nu, Tau Beta Pi.

C. E. Bradford, B.S. (E.E.), 1942, Worcester Polytechnic Institute; M.S. and Ph.D. (physics), 1954, Illinois Institute of Technology; Bell Telephone Laboratories 1954—. Mr. Bradford has investigated the effect of manufacturing tolerances on the operation of electron guns, and has been involved in designing and developing Bell System and military traveling-wave tubes, Bell System masers and a military magnetron. Also, he designed and developed the traveling-wave tube for TH-3 radio system. He is responsible for design engineering for traveling-wave tubes in production by the Western Electric Company. Member, IEEE, A.I.P., Sigma Xi.

RICHARD T. COONEY, B.S.E.E., 1959, University of Rhode Island; M.S.E.E., 1962, Northeastern University; Bell Telephone Laboratories, 1959—. Mr. Cooney's work bas included designing and developing analog portions of the 100A protection switching system, developing the TD-3 transmitter-receiver test set, a noise reduction program on the TH radio system and designing new protection switching systems for microwave radio. Member, IEEE, Eta Kappa Nu, Tau Beta Pi, Phi Kappa Phi.

ELBERT J. DRAZY, B.S.E.E., 1942, Purdue University; Bell Telephone Laboratories 1942—. Mr. Drazy has been concerned with developing test equipment for microwave radar and for microwave radio relay and video transmission systems, as well as developing carrier supplies for the L-type multiplex equipment, and FM terminals for long-haul microwave radio relay systems. Since 1964 he has supervised a group developing microwave networks for radio systems. Member, Tau Beta Pi, Eta Kappa Nu, Sigma Xi.

HARRY E. ELDER, who coordinated the writing of the 14 other men who wrote sections for the article, "Active Solid-State Devices," received his B.S. in E.E. from the University of Illinois in 1948, his M.S. in E.E. from Newark College of Engineering in 1954, and graduated from Bell Telephone Laboratories Communications Development Training Program in 1956. He joined Bell Laboratories in 1951 where he has been concerned with developing electron tubes and solid-state devices. Mr. Elder has been supervisor of microwave diode final development, klystron development, and microwave masers. He is now supervisor of microwave diode final development. He has one traveling wave tube patent and helped write *Microwave Semiconductor Devices and Their Circuit Applications*, McGraw-Hill, 1968. Member, Eta Kappa Nu, Tau Beta Pi, Sigma Tau, Phi Kappa Phi, Phi Lambda Upsilon.

G. L. FENDERSON, B.S.E.E., 1960, University of Maine; M.S.E.E., 1963, Northeastern University; Bell Telephone Laboratories, 1960—. Mr. Fenderson's early work at Bell Laboratories dealt with the development of central office noncommon control switching apparatus. Since 1962 he has been designing and developing broadband solid state amplifiers for microwave radio systems.

JAMES GAMMIE, B.Sc. (E.E.), 1944, University of Aberdeen, Scotland; B.Sc. (Mathematics), 1951, Birkbeck College, University of

London; Bell Telephone Laboratories, 1952—. Mr. Gammie has been concerned with developing transmission systems, including the L3 coaxial system and the TJ and TL short-baul microwave radio systems. He is now developing FM terminals and wire line entrance links for radio relay systems. Member, IEEE.

Annras Hamori, Dipl. Eng., EE, 1955, Technical University of Budapest, Hungary; Bell Telephone Laboratories, 1957—. Mr. Hamori was engaged in developing tbe decoder and tbe line repeater for tbe T1 carrier system. Later he worked on developing the exerciser and the test set for the 100A switching system. He also was associated with developing the transmitter modulator and tbe microwave generator for the TD-3 radio system. He now supervises a group developing the TH-3 radio repeater.

S. D. Hathaway, B.E.E., 1947, University of Virginia; M.S.E.E., 1950, Virginia Polytechnic Institute; M.S.E.E., 1952, University of Illinois Bell Telephone Laboratories 1952—. Mr. Hathaway has been engaged in systems engineering on microwave radio relay systems. He is Head of Radio Systems Engineering Department. Member, IEEE, Eta Kappa Nu, Tau Beta Pi.

W. G. Hensel, B.S.E.E., 1929, Ohio Nortbern University; Bell Telephone Laboratories, 1929—. Mr. Hensel is Head, 4 GHz Long Haul Microwave Department. Member, IEEE.

J. Jan Jansen, S.B. and S.M., 1939, Massachusetts Institute of Technology; Bell Telephone Laboratories 1939—. His early assignments included television terminal circuit design for the L1 coaxial system and the A1 video transmission system. During World War II he worked on several military airborne radar systems. He participated in designing the A2A video system and the television terminals for the L3 coaxial system. Since 1957 he has headed groups in developing the L3, T1, and microwave radio systems. Member, Sigma Xi, Eta Kappa Nu, IEEE.

R. M. Jensen, B.S. in E.E., 1937, Purdue University; Bell Telephone Laboratories, 1937—. He first was engaged in developing audio equipment, and then worked in quality assurance. In 1938 he began developing L-type multiplex networks, and during World War II he was concerned with tuned amplifiers, coaxial filters, and crystal-

controlled oscillators. In 1956 Mr. Jensen was assigned to develop microwave networks, and in 1959 he became a supervisor. In 1964 he began supervising a group designing equipment for TL-2/TM-1 radio relay, FM terminals, wire line entrance link, and TD-3 radio relay, and now his group is designing TH-3 radio relay equipment. Member, Sigma Pi Sigma.

William E. Jewett, B.S.E.E., 1953, University of Kentucky; M.S.E.E., 1965, Stevens Institute of Technology; Bell Telephone Laboratories, 1953—. Mr. Jewett has worked on military and telephone apparatus, and regulated power supplies for telephone systems. In 1962 he was made supervisor of a military and telephone apparatus group, and in 1963 he became supervisor of a power conversion group. Member, IEEE, Eta Kappa Nu, Tau Beta Pi.

Douglas R. Jordan, B.S.E.E., 1952, University of Buffalo; Bell Telephone Laboratories, 1952—. He has worked primarily on the TH and TD-3 microwave radio relay systems. On TH, his assignments included work on the traveling wave tube amplifier, the auxiliary radio channel, the broadband channel equalization, and the antenna system. He supervises a TD-3 system analysis group responsible for establishing the requirements for the microwave transmitter and receiver, and evaluating the radio system performance. Member, IEEE.

Francis M. Klisch, B.E.E., 1963, George Washington University; M.S.E.E., 1965, Northeastern University; Bell Telephone Laboratories, 1963—. Mr. Klisch has been engaged in designing FM terminals and FM terminal test equipment for the TD-3 radio system and developing the new TH-3 6 GHz long haul radio system. Member, Tau Beta Pi.

Shee H. Lee, B.S.E.E., 1961, Tufts University; M.S.E.E., 1963, Northeastern University; Bell Telephone Laboratories, 1961—. Since joining Bell Laboratories, Mr. Lee has been involved in designing and developing IF circuits for microwave radio systems.

N. E. Lentz, B.S.E.E., 1952, Washington State University; Bell Telephone Laboratories 1952—. He completed Bell Laboratories' Communications Development Training Program in 1955, and worked on video amplifiers and test equipment for the TD-2 radio system. Mr. Lentz holds several patents for the timing circuits he designed for the

T-carrier PCM system. Since 1961 he has been developing circuits for FM terminals. Member, Tau Beta Pi, Sigma Tau.

D. J. LEONARD, B.E.E., 1956, and M.E.E., 1960, New York University. Bell Telephone Laboratories 1956—. Mr. Leonard has been concerned with the circuit design and analysis of amplifiers, networks, and logic circuits for various transmission and signaling systems. He has led groups responsible for transmission system circuit development as well as component design, including microwave circuits and networks. He is Director of the Transmission Technology Laboratory. Member, Tau Beta Pi, Eta Kappa Nu.

R. C. MACLEAN, Assoc. E. E., 1958, Franklin Technical Institute; Bell Telephone Laboratories, 1958—. Mr. MacLean has been involved in the design of filters and equalizers for various communication systems and as programmer in the analog computer simulation of various circuits and systems. He is now designing and evaluating active circuits and networks for communication systems.

SAMUEL MOTTEL, B.S.M.E., 1950, City College of New York; M.S.M.E., 1968, Newark College of Engineering; Bell Telephone Laboratories, 1952—. Mr. Mottel has been concerned with power equipment and systems development since joining the Laboratories. He has worked on power for carrier systems, microwave systems, Bell System and military submarine cable systems, data systems and various military communications systems. Since 1963 he has supervised a group working in systems power equipment development areas. Member, A.S.M.E.

PAUL L. PENNEY, B.S.E.E., 1963 and M.S.E.E., 1965, Northeastern University; Bell Telephone Laboratories, 1963—. Mr. Penney had worked on developing microwave upconverter and downconverter circuits for the TD-3 radio system He is now working on broadband IF transistor amplifier circuits. Member, Tau Beta Pi, Eta Kappa Nu.

RONALD C. PRIME, B.Sc. in E.E., 1958, University of Southampton (England); M.S.E., 1961, Princeton; Bell Telephone Laboratories 1961—. His first assignment with Bell Laboratories was to design logic circuits for the 100A switching system which is used to protect TD-2 and TD-3 radio. Later he was engaged in TD-3 repeater bay,

and system measurements. He supervises the systems analysis group responsible for TH-3 radio. Graduate member, IEE.

CHUNG-LI REN, B.S.E.E., 1953, Taiwan College of Engineering; M.S.E.E., 1957, University of Notre Dame; Ph.D. (Electro-physics), 1964, Polytechnic Institute of Brooklyn; Bell Telephone Laboratories, 1965—. At Bell Laboratories, Mr. Ren has done modal analysis of waveguides witb arbitrary cross sections, development of solid state down converters, analysis of coupled TEM line filters with non-adjacent coupling, and tbe design of waveguide filters. He is now developing millimeter wave transmission components. Member, Sigma Xi.

ROBERT E. ROWE, B.S.E.E., University of Maine, June 1960; M.S.E.E., Northeastern University, June 1962; Bell Telephone Laboratories 1960—. Mr. Rowe worked on designing and developing the TL radio test set and the 100A protection switching system test set. Since 1965 he has worked on developing the TD-3 radio microwave transmitter and receiver. Member, IEEE, Tau Beta Pi, Phi Kappa Phi.

ROBERT C. SALVAGE, Associate degree in EE, 1955, Nework College of Engineering Night School; Western Electric Co., 1953–1955; Bell Telephone Laboratories, 1955—. Mr. Salvage started work in the TD-2 microwave system and has since contributed to designs in the TJ, TL, and TM short haul microwave systems. He is now doing development work on FM terminals.

R. E. SHEEHEY, E.E., Assoc., 1960, Wentworth Institute; Bell Telephone Laboratories, 1960—. Mr. Sheehey has been involved in developing various types of electrical networks, and is now designing and developing networks for radio systems.

ROBERT E. SHERMAN, B.S.E.E., 1944, Michigan Technological University; Bell Telephone Laboratories, 1946—. Mr. Sherman's early work consisted of designing high-frequency transmission transformers, including those employed in the original transatlantic cable system. He bas supervised groups designing resistors, inductors, and transformers. Since 1963 he has been supervising a group responsible for designing microwave radio repeaters, modulators, and micro-

wave generators for the new TD-3 system. Senior Member IEEE, member, Tau Beta Pi, Eta Kappa Nu.

ROBERT J. SKRABAL, B.S.M.E., 1949, Columbia University; Bell Telephone Laboratories, 1953—. Since 1959, he has been supervising a group concerned with the mechanical and structural design of microwave antennas, towers and other structures for radio relay systems. He had been involved in the design of a 30-foot tropospheric scatter antenna for the DEW Line and in the development of special air conditioning systems for military electronic equipment. Member, A.S.M.E.; registered professional engineer in the State of New York.

CHARLES P. SUSEN, B.E.E., 1953, Rensselaer Polytechnic Institute; Bell Telephone Laboratories, 1953—. Mr. Susen's work has included designing the microwave carrier supply and the broadband receiver for the TH radio system, work on the 100A protection switching system, and designing the TD-3 radio transmitter-receiver test console. He was responsible for TD-2 equipment improvement, and now is designing mastergroup branching and combining units for use with MMX2 on radio.

GERN A. TUCHEN, Vordiplom, M.E., Technische Hochschule Dresden, 1954; M.S.M.E., California Institute of Technology, 1957; M.S.E.E., New York University, 1959; Bell Telephone Laboratories, 1957—. Mr. Tuchen was first engaged in the mechanical design of the SD ocean cable repeater and later in the mechanical design and systems integration of the *Telstar*® satellite and other communications satellites. He is supervisor of the Mechanical Group in the Transmission Components Department. Member, A.S.M.E.

JOHN A. WORN, B.S., 1930, University of California (Berkeley); Bell Telephone Laboratories, 1930—. Prior to World War II he worked on the design of toll terminal room equipment. During World War II he worked on sonar, communications counter measures and microwave radio. At present, he supervises a group in the equipment design of short- and long-haul microwave radio systems. Member, Tau Beta Pi and Eta Kappa Nu; associate member, Sigma Xi; senior member, IEEE; registered professional engineer in the State of New York.